Puliciphora venata Aldrich

Trans. Entom Soc. London, p. 436 (1896) (*Phora*).

Brues. Trans. Amer. Entom. Soc., vol. 29, p. 382 (1903). (*Pachyneurella*)

Brues. Bull. Wisconsin Nat. Hist. Soc., vol. 12, p. 142 (1915)

I cannot distinguish a series of females taken at Espia, Rio Bopi, Bolivia from the West Indian form. Dr. Mann's specimens were attracted to masses of old cheese that had been abandoned by the expedition. A number of others in my collection from Grenada, B. W. I. were similarly trapped in jars containing chicken bones to which I found them attracted in great numbers.

THE PROBABLE OCCURRENCE OF PARTHENOGENESIS IN *OCHTHIPHILA POLYSTIGMA*. (DIPTERA)

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A total of 68 living specimens of *Ochthiphila polystigma* Meigen (one of the Ochthiphilinæ, a subfamily included among the Acalypterate Diptera) was examined between August 23 and September 30, 1922. All were females; and there is no possibility that the males were found but not recognized as belonging to this species, since during that period no other member of the genus was taken. With the exception of a single female belonging to an apparently undescribed genus, the only other members of the subfamily Ochthiphilinæ taken belonged to the very different genus Leucopis, and here both sexes were found. Eleven of the *O. polystigma* females were dissected, and three more were fixed and sectioned. In none of these was any trace of sperm found. I was during this time making a comparative study of the structure of the internal reproductive organs of the females of all the Acalypteræ, and was thus in a position to know how and where to look for sperm. It is safe to

say that none was present. Yet several of these females contained what appeared to be fully formed eggs—in fact in a number of cases there was an egg already in the uterus. Such females, evidently laying eggs but without sperm present, were found as early as August 23 and as late as the middle of September. At both times there were also found females with ovaries still small—these again being without sperm. It seems clear thus that the results are not due to the collecting having been done either at the beginning of a generation, before males had emerged or at the end of one, after the males had mated and died.

In addition to the live females just discussed, I have examined the pinned material in my own collection, in the collection of the American Museum of Natural History, in that of the United States National Museum, and in that of Prof. J. M. Aldrich. All the specimens of *O. polystigma* found in these collections were again females. The data thus obtained (including the live specimens examined) are summarized in Table I.

Table I. Distribution of *Ochthiphila polystigma* Meigen

State or Province	Number of females	Months in which taken
New Hampshire	1	?
Ontario	7	May—?
Massachusetts	89	June—Sept.
Connecticut	3	May
New York[1]	4	Sept.
New Jersey	1	Sept.
Pennsylvania[1]	8	Oct.
Maryland	3	Apr.—Aug.
Indiana	10	July—Aug.
Illinois	3	June
Wisconsin	1	July
South Dakota	1	June
Manitoba	2	July
Utah	2	July
Holland	2	June
Total	137	Apr.—Oct.

[1]Two of the specimens from New York and all of those from Pennsylvania were taken by Dr. F. Schrader, and have not been seen by me. Dr. Schrader states that all were females.

In the collections of Prof. Aldrich and of the U. S. National Museum are specimens of four other species of Ochthiphila, identified by Coquillett and by Aldrich. These all include males, as will appear from Table II (which also includes 6 European specimens from my own collection). In all four species the males have large conspicuous external claspers, and could not possibly be mistaken for females. This indicates that the failure to find males of *O. polystigma* is not due to failure to recognize them as males.

Table II Relative abundance of the sexes in Ochthiphila.

Species	♀	♂
O. aridella Fallén	11	11
O. elegans Panzer	12	5
O. geniculata Zetterstedt	1	1
O. juncorum Fallén	5	9

A case very similar to the one just described occurs in *Lonchoptera furcata* Fallén. It was found by de Meijere (1906) that nearly all individuals of this species were females, and that these did not have sperm in their receptacles. In other European species, such as *L. lutea* Panzer, both sexes occur in nearly equal numbers, and sperm is present in the receptacles. The extreme scarcity of males has been confirmed by Lundbeck (1916) for the European *L. furcata*, and by Aldrich (1918) for the American forms, which apparently belong to the same species. Aldrich was able to find only two American males of the genus (one from Ontario and one from Colorado), though he recorded 2652 females.

I have myself collected numerous American specimens of Lonchoptera, and have examined the material in the American Museum of Natural History. Table III shows the result of this study. The five males that appear in the table, and two of the California females as well, appear to belong to a distinct species; all the others (except perhaps the Colorado female) are almost certainly *L. furcata*. I have several times obtained eggs from females of this species, and these have hatched into larvæ; but in

no case have I been able to rear these larvæ, nor have I been able to be sure that the mothers did not contain sperm—though it is extremely unlikely that sperm was present. This observation makes it probable, however, that Lonchoptera reproduces by adult parthenogenesis, rather than by pedogenesis.

Table III. Relative abundance of the sexes in Lonchoptera.

State or Province	♀	♂
New Hampshire	1	0
Vermont	1	0
Massachusetts	53	0
New York	403	0
New Jersey	53	0
Ontario	1	0
Pennsylvania	1	0
District of Columbia	1	0
North Carolina	2	0
Wisconsin	1	0
Colorado	1	0
Santa Clara Co., California	426	0
Monterey Co., California	23	4
Truckee, California	344	1
Total	1311	5

Parthenogenesis has been described in the Chironomid genera Chironomus, Corynoneura, and Tanytarsus by Grimm (1870) Johannsen (1912), Goetghebuer (1913), Edwards (1919), and others. Eggs are produced in some cases by the larvæ, in others by the pupæ, and in still others by the imagines. In all cases in which imagines have been produced by parthenogenetic (including pedogenetic) lines, these have been females and have bred parthenogenetically if at all. Males are known to occur in these genera, and in one case even in a species that reproduces parthenogenetically; but in no case are males reported as arising from larvæ known to have been produced by parthenogenesis.

The first case of parthenogenesis recorded among the Diptera was that of the Cecidomyiid, Miastor, discovered by

Wagner (1863). In this case it is the larvæ that reproduce parthenogenetically. Imagines are not often produced, but when they do appear both sexes are found (Meinert 1864, Wagner 1865, Kahle 1908). Kahle states that there is a significant excess of females, and Felt (1911) describes only the female, though he does not state that males were absent. It is not known whether the imagines breed at all, or not; Kahle states that he did not observe copulation. It does not appear to have been entirely proven that the males arise from larvæ that have been produced by pedogenesis, though most students of Miastor have apparently taken this for granted without making cultures from isolated larvæ.

Parker (1922) has reported a probable case of pedogenesis in the blow-fly, *Calliphora erythrocephala* Meigen, with the production of male and female imagines in something like equal numbers from isolated individual larvæ. Since the actual production of eggs or larvæ was not observed to go on in Parker's larvæ, and since Lowne (1892) and others have dissected large numbers of larvæ of this species without finding mature eggs or larvæ in them, it seems best to withhold judgment for the present as to the occurrence of pedogenesis in Calliphora, as Parker himself indicates.

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